What is claimed is:

1. A method of descreening a screened image generated from an original image, comprising the steps of:

(a) detecting the position of each halftone dot forming said screened image;

(b) detecting from said screened image an arrangement of picture-originated pixels in a gradation area of an image from which said screened image is generated; and

(c) generating layout data having multi-level gradation from said screened image,

said step (c) including the steps of

(c-1) bringing predetermined threshold values into correspondence with individual recorder grids constituting each halftone cell determined in said step (a), and

(c-2) setting gradation levels in the gradation area for descreened layout data, said gradation levels in the gradation area being set based on a correspondence between said predetermined threshold values and whether or not the recorder grids present in the position of each of said picture-originated pixels contribute to halftone dot formation.

2. The method according to claim 1, further comprising the step of

(d) separating a first region from which the gradation area is to be derived and a second region from which a monotone area is to be derived from each other by using a separation mask,

the descreening being performed only on said first region.

3. The method according to claim 2, further comprising the step of

(e) specifying inconsistent recorder grids forming each halftone dot and having

a contradiction between a result of an assumption that binarization is performed using said threshold values brought into correspondence in said step (c-1) and an actual state of binarization, to correct said separation mask based on a positional relationship between said inconsistent recorder grids in each halftone cell.

4. A method of descreening a screened image generated from an original image, comprising the step of

(a) detecting from said screened image an arrangement of picture-originated pixels in a gradation area in an image from which said screened image is generated.

5. The method according to claim 4, wherein

said step (a) includes the step of

(a-1) extracting edges of halftone dots forming said screened image.

6. The method according to claim 5, wherein

count distributions of said edges in a plurality of predetermined counting directions on said screened image are obtained for said counting directions respectively by counting said edges, and peak positions in said count distributions are specified as boundary positions between said picture-originated pixels.

7. The method according to claim 4, wherein

in said step (a), said arrangement of said picture-originated pixels is detected based on the shapes of halftone dots positioned on a boundary between a plurality of regions having different dot percentages in said screened image.

8. A method of descreening a screened image generated from an original image, comprising the step of

(a) detecting the position of each halftone dot forming said screened image,

wherein, in said step (a), count distributions of recorder grids in a plurality of counting directions on said screened image are obtained for said counting directions respectively by counting said recorder grids, and the position of each halftone dot is detected based on the dependence of said count distributions upon said counting directions.

9. The method according to claim 8, wherein

a screen angle and a screen ruling are determined based on one of said counting directions which provides the maximum count at a peak in said count distributions and the maximum peak-to-peak spacing.

10. The method according to claim 9, wherein

the central position of each halftone dot is determined from a peak position in a count distribution for a first counting direction corresponding to said screen angle and a peak position in a count distribution for a second counting direction perpendicular to said first counting direction.

11. An image processing device for descreening a screened image generated from an original image, comprising:

(a) a halftone dot position detection element for detecting the position of each halftone dot forming said screened image;

(b) a picture-originated pixel arrangement detection element for detecting from

said screened image an arrangement of picture-originated pixels in a gradation area of an image from which said screened image is generated; and

(c) a descreening element for generating layout data having multi-level gradation from said screened image,

said descreening element including

(c-1) a threshold value setting element for bringing predetermined threshold values into correspondence with individual recorder grids constituting each halftone cell determined by said halftone dot position detection element, and

(c-2) a gradation level setting element for setting gradation levels in the gradation area for descreened layout data, said gradation levels in the gradation area being set based on a correspondence between said predetermined threshold values and whether or not the recorder grids present in the position of each of said picture-originated pixels contribute to halftone dot formation.

12. The image processing device according to claim 11, further comprising

(d) a region separation element for separating a first region from which the gradation area is to be derived and a second region from which a monotone area is to be derived from each other by using a separation mask,

the descreening being performed only on said first region.

13. The image processing device according to claim 12, further comprising

(e) a separation mask correction element for specifying inconsistent recorder grids forming each halftone dot and having a contradiction between a result of an assumption that binarization is performed using said threshold values brought into correspondence by said threshold value setting element and an actual state of binarization,

to correct said separation mask based on a positional relationship between said inconsistent recorder grids in each halftone cell.

14. An image processing device for descreening a screened image generated from an original image, comprising:

a descreening element for generating layout data having multi-level gradation from said screened image; and

a picture-originated pixel arrangement detection element for detecting from said screened image an arrangement of picture-originated pixels in a gradation area of an image from which said screened image is generated.

15. The image processing device according to claim 14, wherein

said picture-originated pixel arrangement detection element includes

an edge extraction element for extracting edges of halftone dots forming said screened image.

16. The image processing device according to claim 15, wherein

count distributions of said edges in a plurality of predetermined counting directions on said screened image are obtained for said counting directions respectively by counting said edges, and peak positions in said count distributions are specified as boundary positions between said picture-originated pixels.

17. The image processing device according to claim 14, wherein

said picture-originated pixel arrangement detection element detects said arrangement of said picture-originated pixels, based on the shapes of halftone dots

positioned on a boundary between a plurality of regions having different dot percentages in said screened image.

18. An image processing device for descreening a screened image generated from an original image, comprising:

a descreening element for generating layout data having multi-level gradation from said screened image; and

a halftone dot position detection element for detecting the position of each halftone dot forming said screened image,

wherein said halftone dot position detection element obtains count distributions of recorder grids in a plurality of counting directions on said screened image for said counting directions respectively by counting said recorder grids, thereby to detect the position of each halftone dot, based on the dependence of said count distributions upon said counting directions.

19. The image processing device according to claim 18, wherein

a screen angle and a screen ruling are determined based on one of said counting directions which provides the maximum count at a peak in said count distributions and the maximum peak-to-peak spacing.

20. The image processing device according to claim 19, wherein

the central position of each halftone dot is determined from a peak position in a count distribution for a first counting direction corresponding to said screen angle and a peak position in a count distribution for a second counting direction perpendicular to said first counting direction.

21. A program executed in a computer to thereby cause said computer to operate as a control element for an image processing device for descreening a screened image generated from an original image, said image processing device comprising:

(a) a halftone dot position detection element for detecting the position of each halftone dot forming said screened image;

(b) a picture-originated pixel arrangement detection element for detecting from said screened image an arrangement of picture-originated pixels in a gradation area of an image from which said screened image is generated; and

(c) a descreening element for generating layout data having multi-level gradation from said screened image,

said descreening element including

(c-1) a threshold value setting element for bringing predetermined threshold values into correspondence with individual recorder grids constituting each halftone cell determined by said halftone dot position detection element, and

(c-2) a gradation level setting element for setting gradation levels in the gradation area for descreened layout data, said gradation levels in the gradation area being set based on a correspondence between said predetermined threshold values and whether or not the recorder grids present in the position of each of said picture-originated pixels contribute to halftone dot formation.

22. A method of separating a first region from which a gradation area is to be derived and a second region from which a monotone area is to be derived from each other in a screened image generated from an original image, comprising the steps of:

(a) acquiring a separation mask corresponding to said screened image;

(b) detecting the position of each halftone dot forming said screened image;

(c) detecting from said screened image an arrangement of picture-originated pixels in the gradation area of an image from which said screened image is generated; and

(d) judging whether or not said separation mask requires correction, said step (d) including the steps of

(d-1) bringing predetermined threshold values into correspondence with individual recorder grids constituting each halftone cell determined in said step (b), and

(d-2) specifying inconsistent recorder grids forming each halftone dot and having a contradiction between a result of an assumption that binarization is performed using said threshold values brought into correspondence in said step (d-1) and an actual state of binarization, to judge whether or not said separation mask requires correction, based on a positional relationship between said inconsistent recorder grids in each halftone cell,

said inconsistent recorder grids being specified based on a correspondence between said predetermined threshold values and whether or not the recorder grids present in the position of each of said picture-originated pixels contribute to halftone dot formation; and

(e) correcting said separation mask based on the positional relationship between said inconsistent recorder grids when it is judged in said step (d) that said separation mask requires correction.

23. An image processing device for separating a first region from which a gradation area is to be derived and a second region from which a monotone area is to be derived from each other in a screened image generated from an original image, comprising:

(a) a separation mask acquiring element for acquiring a separation mask;

(b) a halftone dot position detection element for detecting the position of each halftone dot forming said screened image;

(c) a picture-originated pixel arrangement detection element for detecting from said screened image an arrangement of picture-originated pixels in the gradation area of an image from which said screened image is generated; and

(d) a judging element for judging whether or not said separation mask requires correction, said judging element including

(d-1) a threshold value setting element for bringing predetermined threshold values into correspondence with individual recorder grids constituting each halftone cell determined by said halftone dot position detection element, and

(d-2) a judgment processing element for specifying inconsistent recorder grids forming each halftone dot and having a contradiction between a result of an assumption that binarization is performed using said threshold values brought into correspondence by said threshold value setting element and an actual state of binarization, to judge whether or not said separation mask requires correction, based on a positional relationship between said inconsistent recorder grids in each halftone cell,

said inconsistent recorder grids being specified based on a correspondence between said predetermined threshold values and whether or not the recorder grids present in the position of each of said picture-originated pixels contribute to halftone dot formation; and

(e) a correction element for correcting said separation mask based on the positional relationship between said inconsistent recorder grids when it is judged by said judging element that said separation mask requires correction.

24. A program executed in a computer to thereby cause said computer to operate as a control element for an image processing device for separating a first region from which a gradation area is to be derived and a second region from which a monotone area is to be derived from each other in a screened image generated from an original image, said image processing device comprising:

(a) a separation mask acquiring element for acquiring a separation mask;

(b) a halftone dot position detection element for detecting the position of each halftone dot forming said screened image;

(c) a picture-originated pixel arrangement detection element for detecting from said screened image an arrangement of picture-originated pixels in the gradation area of an image from which said screened image is generated; and

(d) a judging element for judging whether or not said separation mask requires correction, said judging element including

(d-1) a threshold value setting element for bringing predetermined threshold values into correspondence with individual recorder grids constituting each halftone cell determined by said halftone dot position detection element, and

(d-2) a judgment processing element for specifying inconsistent recorder grids forming each halftone dot and having a contradiction between a result of an assumption that binarization is performed using said threshold values brought into correspondence by said threshold value setting element and an actual state of binarization, to judge whether or not said separation mask requires correction, based on a positional relationship between said inconsistent recorder grids in each halftone cell,

said inconsistent recorder grids being specified based on a correspondence between said predetermined threshold values and whether or not the recorder grids present in the position of each of said picture-originated pixels contribute to halftone dot

formation; and

(e) a correction element for correcting said separation mask based on the positional relationship between said inconsistent recorder grids when it is judged by said judging element that said separation mask requires correction.